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## Description

### Background of the invention

The present invention relates to a method for positioning a tube in the small intestine for the purpose of supplying fluid to the small intestine or draining it.

Occasionally the human stomach must be bypassed for fluid supply directly to the intestine. The background for this is as follows. After a major operation, especially in the abdomen, the stomach is temporarily paralysed for a few days, and the patient has difficulty in eating and keeping his food down. As a result, the supply of nutriment via the stomach is replaced by intravenous ingestion. However, this technique suffers from a number of shortcomings and necessitates the use of sterile solutions which will be expensive because they can be supplied only by trained nurses. In addition, the veins frequently become inflamed locally, and other changes may be caused by the inactivity of the intestine. It will thus be obvious that there are several reasons for postoperative supply of nutriment via the intestine. It is generally considered among surgeons that the postoperative supply of nutriment via the intestine (enteral supply) will gain ground in the next decade.

It is, however, no easy matter to pass a catheter past the stomach to the small intestine. It has been tried to use a catheter to which a balloon was affixed, and on the balloon mercury was deposited. This catheter which is termed the Miller-Abbott catheter, is used very restrictively, inter alia because of the risk of mercury leakage. The catheters that are available on the market suffer from the disadvantage that X-ray technique is required to be able to pass the catheter past the stomach and down into the intestine.

### Summary of the invention

The object of the invention is to solve the last-mentioned problem in a simple and feasible manner.

The object is achieved by a method according to the single claim. After the tube length has been passed down into the stomach and coiled up, the ingestion of food takes place in the normal manner for a predetermined period of time during which the coiled-up tube length is transported into the intestine by the processed food and the stomach movements. The intestine perceives the coiled-up (programmed) tube length as food, and the peristalsis of the intestine passes the tube length further down. In this manner, the catheter has imparted to it the unique property of being self-feeding.

A tube equipment for such supply of fluid or for draining comprises a flexible and elastic, plastic or rubber material, for example silicone rubber, which has in its unactuated state and along at least a part of its length a coiling-up tendency, and a guide insertable into the tube and consisting of a flexible but unelastic material, for example a steel wire which, in its unactuated state, tends to straighten itself with a force exceeding the coiling-up force of the tube, the guide after insertion in the tube maintaining said tube in a straightened-out state for insertion in a cavity via a passage and permitting, after withdrawal, coiling-up of the tube length within said cavity.

### Brief description of the drawings

The invention will be described in more detail below, reference being had to the accompanying drawing, which is an elevational view of a tube equipment, Fig. 1 showing a guide inserted in the tube and Fig. 2 showing the guide partly withdrawn.

### Detailed description

Fig. 1 shows a tube 10 of flexible and elastic, plastic material which, for medical use, preferably consists of silicone rubber. The tube may be manufactured in conventional manner, but before the material has finally hardened, the tube is coiled up on a core of suitable cross-section and is finally hardened in this condition. After the core has been removed, the tube will thus tend to coil up. The coiling-up tendency can be imparted to the tube also in other ways, for example by selecting a suitable material, or by subsequent heating and curing on a core. At one end, the tube 10 has a widened portion or lugs 11 providing a firm hold on the tube, and the tube end can be affixed in a suitable holder. At its opposite end 12, the tube may be perforated, as shown at 13, and furthermore it may be provided with a means 14 traceable by X-ray technique. The tube 10 preferably is manufactured in large lengths which are then cut into suitable pieces which are provided with lugs 11 and, if required, perforations 13 and an X-ray contrast agent 14 which may consist of a material inserted in the tube wall or affixed thereto, such as a thin metal piece.

Inserted in the tube 10 is a guide 15 which consists of a flexible but unelastic, relatively rigid material, preferably a stranded steel wire. A guide 15 has at one end a handle-like portion 16 to facilitate insertion of the guide 15 in the tube and its withdrawal therefrom. The guide 15 has a length which corresponds to or is slightly shorter than the length of the tube 10. The guide also has a ten-

dency to straighten itself with a force exceeding the coiling-up force of the tube.

In its unactuated state, the tube 10 is coiled up in the manner illustrated in Fig. 2, but is straightened out by insertion of the guide 15, as shown in Fig. 1.

For the primary object of the invention, which is the supply of nutriment directly to the intestine following an operation, one proceeds as follows. Some time before the operation, for example one or two days, the tube 10 with the guide 15 inserted therein is passed through the patient's nose, throat and gullet until the lower tube end 12 enters the stomach. Care must be taken that the tube will extend all the way from the gullet through the stomach and enter the small intestine with an end portion. For this purpose, it may be necessary to withdraw the guide 15 a distance such that the outer tube end will coil up, whereupon a further length of tube is passed down into the stomach. After that, the guide is withdrawn in its entirety, and the outer tube end is fixed by some suitable means. The patient now can ingest in the normal way. The food which enters the stomach surrounds the coiled-up tube end which is now processed by the stomach in the same manner as the food and is passed together with the food into the small intestine, after it has been straightened, and is retained therein. The position of the tube end is readily checked by X-ray technique. The patient is now operated upon, and after the operation nutriment can be readily administered to the patient. To facilitate the administration of nutriment in the intestine, the tube end can have the perforations 13 shown in Fig. 1.

The invention can be used for administration of drugs directly into the intestine when the stomach does not tolerate the drug in question. The tube 10 shown in the drawing has such dimensions, that, after it has been positioned in the gullet, it does not prevent normal ingestion of food.

#### Claims

1. A method for positioning a tube in the small intestine for the purpose of supplying fluid to the small intestine or draining it, which method comprises the steps of inserting a predetermined length of a tube (10) made of a flexible elastic material and having an inherent tendency to coil up along at least said predetermined length, into the stomach via the throat by means of a guide (15) inserted in the tube and made from a flexible but unelastic material, said guide (15) tending to straighten itself in the unactuated state with a force exceeding the force of the coiling-up tendency of the tube (10); withdrawing the guide (15) from

the tube (10) such that the tube (10) can coil up within the stomach; and supplying a substance to the stomach via the throat outside the tube, whereby the tube (10) is straightened and transported to the small intestine together with the substance.

#### Patentansprüche

1. Verfahren zum Positionieren eines Schlauchs im Dünndarm, um dem Dünndarm Flüssigkeit zuzuführen oder daraus abzuleiten, umfassend die folgenden Schritte: Einführen eines vorbestimmten Abschnitts eines Schlauchs (10), der aus einem biegsamen elastischen Material hergestellt ist und eine innewohnende Neigung hat, sich zumindest um den genannten vorbestimmten Abschnitt schraubenförmig aufzurollen, in den Magen durch den Rachen mittels einer im Schlauch eingesteckten Führung (15) aus einem biegsamen, jedoch unelastischen Material, die dazu neigt, sich im nicht betätigten Zustand gerade zu richten, und zwar mit einer Kraft, die die Kraft der Aufrollneigung des Schlauchs (10) übersteigt; Herausziehen der Führung (15) aus dem Schlauch (10), damit sich dieser im Magen schraubenförmig aufrollen kann; und Zuführen eines Stoffs zum Magen durch den Rachen ausserhalb des Schlauchs, wodurch der Schlauch (10) gerade gerichtet und zusammen mit dem Stoff dem Darm zugeführt wird.

#### Revendications

1. Procédé pour positionner un tube dans l'intestin grêle dans le but de fournir un fluide à l'intestin grêle ou de le drainer, qui comprend les étapes consistant à insérer une longueur prédéterminée d'un tube (10), constitué par une matière élastique flexible et ayant une tendance inhérente à s'enrouler le long de ladite longueur prédéterminée au moins, dans l'estomac par la gorge au moyen d'un guide (15) inséré dans le tube et constitué par une matière flexible mais non élastique, ledit guide (15) ayant tendance à se redresser à l'état non actionné avec une force supérieure à la force de la tendance à l'enroulement du tube (10), à retirer le guide (15) du tube (10) de manière que le tube (10) puisse s'enrouler à l'intérieur de l'estomac, et à fournir une substance à l'estomac par la gorge, à l'extérieur du tube, de sorte que le tube (10) est redressé et transporté dans l'intestin grêle en même temps que la substance.

Fig. 1

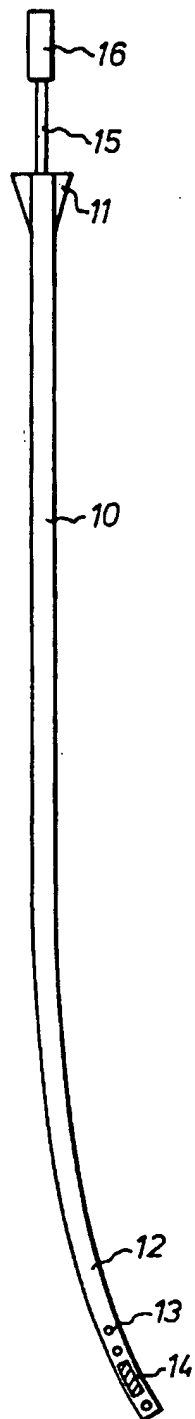


Fig. 2

